

Rare Crayfishes Get Closer Look by MDC Biologists

MDC has determined that one of Missouri's rarest crayfish species may be more common than we had thought, but that another is indeed, very rare in our state. The Crayfish Crew recently completed



distribution and habitat surveys for two "critically imperiled" crayfishes in southwest Missouri. During 2002 – 2004 researchers sampled 71 randomly selected stream segments out of a total of 223 segments in the White River drainage of Missouri, looking for Williams' crayfish (*Orconectes williamsi*) and Meek's

crayfish (*Orconectes meeki*). These crayfishes occur nowhere else in the world but this drainage in Missouri and Arkansas; prior to these surveys both species were regarded as among our rarest. There were 9 known Missouri locations for Williams' crayfish in Barry, Christian, Stone and Taney counties; whereas there were only 3 known sites in Stone County for Meek's crayfish.

The surveys' objectives were to estimate the distribution of the rare crayfishes and to identify associations between their presence and selected small-, medium- and large-scale environmental factors. The researchers used a probabilistic survey method based on stream size. This method's advantage is that it not only produces "detection rates" (percentages) for the target species in sampled streams, but that it can then be used to estimate the presence of these species in the remainder of unsampled streams for the entire drainage and for stream sizes. The researchers measured 22 small-, medium-, and large (watershed)-scale environmental factors for each sampling site, to determine whether they might be predictive of presence of either crayfish.

Williams' crayfish was detected at 34% of sampled sites and at 20 previously undocumented locations. Additional sampling confirmed the presence of this crayfish at 7 of the 9 locations previously recorded by retired MDC biologist William Pflieger in the 1980s. In total, 27 stream segments in Barry, Christian, Stone, and Taney counties are now known to harbor William's crayfish, and most locations are immediately

surrounding and to the east of Table Rock Reservoir. Meek's crayfish was detected at a much lower rate of 8% and at 6 total sites, but at only 1 of the 3 historic locations. Many stream segments harboring Williams' crayfish and most locations for Meek's crayfish were determined to be effectively isolated from similarly populated segments by Table Rock and Bull Shoals reservoirs, causing concern for long term conservation of these species.



Williams' crayfish (*Orconectes williamsi*)

The environmental factors that were predictive of Williams' crayfish presence were high current velocities, shallow depths, and softball- to basketball-sized rocks on the bottom of small streams. This crayfish was also found in stream channels that were narrower and deeper rather than stream channels where banks were eroding and leaving wider and shallower stream channels. Meek's crayfish was typically collected from larger (baseball- to softball-sized) rocks with minimal silt and fine sediments, in the very smallest headwater streams. All Meek's crayfish sites were underlain by a Canadian Limestone/Dolomite geology. Both crayfish species avoided high densities of water willow (*Justicia* sp.) plant patches.



Meek's crayfish (*Orconectes meeki*)

The White River drainage of Missouri has an extensive network of historic and active lead and gravel mines, as well as increasing land use disturbance associated with rapidly increasing urbanization in formerly rural portions of the drainage, and these activities potentially affect chemical and physical stream habitats and their associated crayfishes. Lead mine residues have

recently been shown to cause severe declines in stream crayfish populations. Soil and sediment erosion is the major form of pollution in Missouri streams, and much of it originates from gravel mines and urban land disturbance projects. However, soil erosion can be controlled by using best management practices such as properly installed and maintained silt fences and sediment traps at urban development sites. Fragmentation of the Williams' crayfish and Meek's crayfish populations by reservoirs is a cause for concern with regard to recolonization of sites that may suffer declines or simply with regard to genetic exchange. Our failure to detect both species at historical known locations may be additional reason for concern.

This research significantly increased the known number of locations for Williams' crayfish from 9 to 27. Survey data were recently used to downgrade this species' state conservation rank from "critically imperiled" to "imperiled", although identified threats suggest that a close watch be kept on this crayfish. Alternatively, Meek's crayfish remains rare enough to warrant concern about its future status in Missouri and justify continuation of its state rank of "critically imperiled", despite recent information suggesting that it is more common in Arkansas.